

REGISTER
OF
THE LEHIGH UNIVERSITY.
1882-1883.

TUITION FREE.

SOUTH BETHLEHEM, PA.,
1883.

REGISTER

— OF —

THE LEHIGH UNIVERSITY,

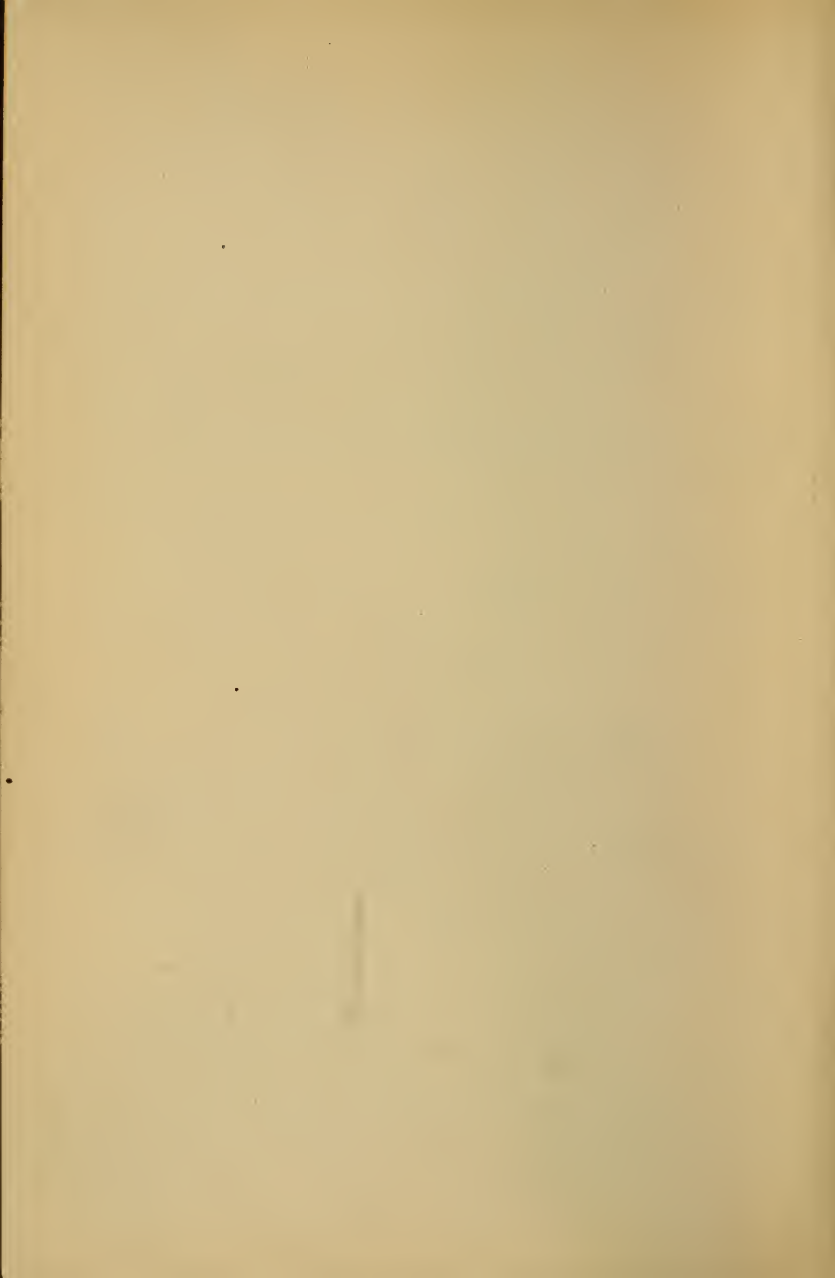
SOUTH BETHLEHEM, PA.,

1882-1883.

FOUNDED BY ASA PACKER.

TUITION FREE.

BETHLEHEM, PA.,
H. T. CLAUDER, PRINTER
1883.



CALENDAR.

1882-83.

1882.

Sept. 6,	Wednesday . . .	First Term begins.
Oct. 12,	Thursday . . .	Founder's Day.
Nov. 30,	Thursday . . .	Thanksgiving Day.
Dec. 20,	Wednesday . . .	First Term ends.

1883.

Jan. 10,	Wednesday . . .	Second Term begins.
Feb. 7,	Ash Wednesday . . .	
Feb. 22,	Thursday . . .	Washington's Birthday.
March 22,	Thursday . . .	Easter Holidays begin.
March 27,	Tuesday . . .	Easter Holidays end at 8 $\frac{1}{4}$ A.M.
June 4,	Monday . . .	Annual Examinations begin.
June 15-16,	Friday and Saturday	Examinations for Admission.
June 17,	Sunday . . .	University Sermon.
June 20,	Wednesday . . .	Address before the Alumni.
June 21,	Thursday . . .	University Day.

1883-84.

1883.

Sept. 3-4,	Monday and Tuesday	Examinations for Admission.
Sept. 5,	Wednesday . . .	First Term begins.
Oct. 11,	Thursday . . .	Founder's Day.
Nov. 29,	Thursday . . .	Thanksgiving Day.
Dec. 19,	Wednesday . . .	First Term ends.

1884.

Jan. 9,	Wednesday . . .	Second Term begins.
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FACULTY.

ROBERT A. LAMBERTON, LL.D., *President.*

HENRY COPPÉE, LL.D.,

*Professor of English Literature, International and Constitutional Law,
and the Philosophy of History.*

WILLIAM H. CHANDLER, Ph. D., F.C.S.,

Professor of Chemistry and Director of University Library.

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Professor of Mineralogy and Metallurgy.

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Professor of Physics and Mechanics.

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Professor of Economic Geology.

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Professor of Mathematics and Astronomy.

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Chaplain and Professor of Psychology, Christian Evidences and Rhetoric.

EDWARD H. WILLIAMS, JR., A.B., E.M., A.C.,
Professor of Mining and Geology.

J. F. KLEIN, D.E.,
Professor of Mechanical Engineering.

LECTURER.

TRAILL GREEN, M.D., LL.D.,
Lecturer on Physiology and Hygiene.

INSTRUCTORS.

SPENCER V. RICE, C.E.,
Instructor in Drawing.

E. H. S. BAILEY, Ph.B.,
Instructor in Chemistry.

A. E. MEAKER, C.E.,
Instructor in Mathematics

LESTER P. BRECKENRIDGE, Ph.B.,
Instructor in Mechanical Engineering.

COURTNEY LANGDON,
Instructor in Modern Languages.

MARTIN WITTMER, E.M.,
Instructor in Chemistry.

T. W. WRIGHT, A.M.,
Instructor in Civil Engineering.

A. W. STERNER,
Clerk to Director of the Library.

STUDENTS.

Clas.—Classical Course.	C. E.—Civil Engineering.
L. S.—Latin-Scientific Course.	E. M.—Mining Engineering.
Sci.—Scientific Course.	M. E.—Mechanical Engineering.
Tech.—Technical Courses.	Met.—Metallurgy.
A. C.—Analytical Chemistry.	

GRADUATES.

Murray Morris Duncan, A.C., E.M.,	Chattanooga, Tenn.
Arthur E. Meaker, C.E.,	Bethlehem, Pa.
Lewis Stockton, A.B.,	Phoenixville, Pa.
Leonard Blakslee Treharn, A.B.,	Reading, Pa.
Martin Wittmer, E.M.,	Etna, Pa.

FIFTH YEAR STUDENTS.

	COURSE.	RESIDENCE.
Louis Oscar Emmerich,	E.M.,	New York City.
John Dougherty Ruff,	E.M.,	Philadelphia.

SENIOR CLASS.

	COURSE.	RESIDENCE.
✓ Enos Kellar Bachman,	E M.,	Pottstown.
✓ Walter Briggs,	Clas.,	Scranton.
✓ Harry Augustus Butler,	Sci.,	Mauch Chunk.
✓ Hedley Vicars Cooke,	Clas.,	Bethlehem.
✓ Francis Joseph Crilly,	Clas.,	Allentown.
✓ Francis Wharton Dalrymple,	C.E.,	Lock Haven.
✓ Timothy James Donahoe,	E.M.,	South Bethlehem.
✓ George Francis Duck,	E.M.,	Englewood, N. J.
✓ Alfred Edmond Forstall,	M E.,	New Orleans, La.
✓ Nathaniel Oliver Goldsmith,	M E.,	Glendale, O.

	COURSE.	RESIDENCE.
✓ William Theodore Goodnow,	C.E.,	Toledo, O.
✓ John Daniel Hoffman,	Clas.,	Bethlehem.
✓ George Gowen Hood,	C.E.,	Philadelphia.
✓ Garret Linderman Hoppes,	C.E.,	Bethlehem.
✓ Julian de Bruyn Kops, B.E.,	C.E.,	Savannah, Ga.
✓ Preston Albert Lambert,	Clas.,	Seidersville.
*John Wood Leithead,	C.E.,	Rockland, Del.
✓ Edwin Francis Miller,	M.E.,	Lionville.
✓ Wilson Franklin More,	Clas.,	Bethlehem.
✓ Nelson Morrow,	M.E.,	Oswego, N. Y.
✓ Thomas Nicholson, jr.,	M.E.,	Jenkintown.
✓ George Spencer Patterson,	E.M.,	Mahanoy City.
✓ Richard Rembrandt Peale.	Sci.,	Lock Haven.
✓ Henry Allebach Porterfield,	E.M.,	Emlenton.
✓ Francis Henry Purnell,	C.E.,	Berlin, Md.
✓ Jesse Wilford Reno,	E.M.,	Boston, Mass.
✓ Charles Loomis Rogers,	M.E.,	Greene, N. Y.
✓ John Ruddle,	M.E.,	East Mauch Chunk.
✓ Charles Henry Stinson,	Sci.,	Norristown.
✓ Robert Stinson.	Sci.,	Norristown.

JUNIOR CLASS.

	COURSE.	RESIDENCE.
Elmer Ellsworth Brosius,	E. M.,	Lewistown.
Robert Grier Cooke,	Clas.,	Bethlehem.
Henry Bowman Douglas,	E.M.,	Fort Cameron, Utah.
John Roberts Engelbert,	C.E.,	Wiconisco.
William Banks Foote,	E.M.,	Rochester, N. Y.
Harry Tallman Harper,	C.E.,	Wiconisco.
Harry Hurd Hillegass,	C.E.,	Reading.
Edwin Franklin Hofferd,	C.E.,	Lehighton.
John Andrew Jardine,	E.M.,	McCainsville, N. J.
James Warner Kellogg,	A.C.,	Atchison, Kan.
David Garrett Kerr,	E.M.,	Wilkinsburgh.
Frederick Bowman Langston, jr.,	C.E.,	Bethlehem.
William Langston,	C.E.,	Bethlehem.

* Absent on account of sickness.

	COURSE.	RESIDENCE.
Robert Packer Linderman,	L.S.,	South Bethlehem.
Joseph Franklin Merkle,	C.E.,	Cressona.
Harry Krider Myers,	C.E.,	Tyrone.
Albino Rosendo Nuncio,	M.E.,	Saltillo, Mexico.
James Ward Packard,	M.E.,	Warren, O.
Alfred Scull Reeves,	E.M.,	Phoenixville.
Lewis Buckley Semple,	Clas.,	South Bethlehem.
Augustus Parker Smith,	M.E.,	Norwich, Conn.
Murray Stewart,	E.M.,	Reading.
Richard Washington Walker,	C.E.,	Barneston.
James Angus Watson,	C.E.,	Catonsville, Md.
Wyle Thompson Wilson,	C.E.,	Philadelphia.

SOPHOMORE CLASS.

	COURSE.	RESIDENCE.
Warren Howard Allen,	A.C.,	Athens.
William Lowrey Beverson,	C.E.,	York.
Theodore Weld Birney,	C.E.,	Washington, D. C.
Harry Luther Bowman,	E.M.,	Millersville.
William Harvey Cooke,	Clas.,	Bethlehem.
William Noble Edson,	M.E.,	Clifton Springs, N. Y.
Felix Freyhold,	C.E.,	Washington, D. C.
James McKinley Graeff,	E.M.,	Pottsville.
Charles Owens Haines,	M.E.,	Savannah, Ga.
Irving Andrew Heikes,	E.M.,	Mechanicsburg.
Harry Oberly Jones,	Sci.,	Freemansburg.
Charles A. Junkin,	C.E.,	Washington, D. C.
John Myron Kellogg,	Met.,	Liberty Corner
Edward Morton McIlvaine,	A.C.,	Reading.
Arnon Permin Miller,	A.C.,	South Bethlehem.
David Kirk Nicholson,	M.E.,	Jenkintown.
John Wesley Peale,	E.M.,	Lock Haven.
Henry Drinker Peet,	C.E.,	Newport, R. I.
Fayette Brown Petersen,	C.E.,	Washington, D. C.
Francis William Birchal Pile,	E.M.,	London, England.
John Bertsch Price,	C.E.,	Upper Lehigh.
Byron Elmer Rhoads,	C.E.,	Lake.

	COURSE.	RESIDENCE.
William Sherman Roth,	E.M.,	Allentown.
Harry William Rowley,	M.E.,	South Bethlehem.
Barry Searle.	A.C.,	Montrose.
Elliot Otis Smith,	C.E.,	Maquoketa, Iowa.
George Washington Snyder,	C.E.,	Pottsville.
Robert Daniel Stewart,	A.C.,	Lancaster.
Thomas Broomal Temple,	E.M.,	Lionville,
Charles Elihu Thomas,	C.E.,	Pottstown.
Clarence Moncure Tolman,	M.E.,	Washington, D. C.
John Wagner,	M.E.,	South Bethlehem.
James Hollis Wells,	M.E.,	Bethlehem.
Cabell Whitehead,	M.E.,	Amherst, Va.
Charles Frederick Zimmele,	L.S.,	Bethlehem.

FRESHMAN CLASS.

	COURSE.	RESIDENCE.
David Bast Abbott,	Tech.,	Bethlehem.
Philip Albrecht,	Tech.,	New Orleans, La.
Edgar Augustus Alcott,	Tech.,	Mt. Holly, N. J.
Leighton Irvin Baldwin,	Tech.,	Mahanoy City.
Francisco Alberto Bermudes,	Tech.,	Leon, Nicaragua.
George Rodney Booth,	L.S.,	Bethlehem.
William James Jarard Bowman,	Tech.,	Trenton, N. J.
Richard Singmaster Breinig,	Tech.,	Breinigsville.
John Henry Brown,	Tech.,	South Bethlehem.
Charles Rossiter Burnham,	Tech.,	Philadelphia.
Charles Ellsworth Clapp,	L.S.,	Warren, O.
George Henry Cobb,	Tech.,	Palmer, Mass.
Josè de Cueto,	Tech.,	Asturias, Spain.
Richard Harding Davis,	L.S.,	Philadelphia.
William Henry Dean,	Tech.,	Clarence, Iowa.
Alfred Doolittle,	Clas.,	Bethlehem.
Samuel Lyman Ferguson,	Sci.,	Clayton, Mass.
Frederick William Fink,	Tech.,	Summit Hill.
Julian Hazlehurst Fleming,	Tech.,	Augusta, Ga.
Harry William Frauenthal,	Tech.,	Wilkes-Barre.

	COURSE.	RESIDENCE.
Harry James Frear,	Tech.,	Factoryville.
Charles William Frey,	Tech.,	Bethlehem.
Robert Caldwell Gotwald,	Tech.,	York.
Charles Graham, jr.,	Tech.,	Kingston.
Lewis John Henry Grossart,	Tech.,	Allentown.
Max Sigmund Hanauer,	Tech.,	Lancaster.
Solomon Jacob Harwi,	Tech.,	Friedensville.
Lloyd Robinson Hawley,	Tech.,	Dixon, Ill.
George North Hayward,	Tech.,	Buffalo, N. Y.
Simeon Cole Hazleton,	Tech.,	Washington, D. C.
William Henry Heiser,	Tech.,	Mt. Carmel.
Mark Antony DeWolfe Howe, jr.,	Clas.,	Reading.
James Henry Jacobson,	Tech.,	Bethlehem.
Arthur Monroe Jaggard,	Tech.,	Altoona.
Harry Orlando Koller,	Tech.,	Reading.
Edward Langston,	Tech.,	Bethlehem.
Robert Thomas Lawther,	Tech.,	Wyoming.
Garret Brodhead Linderman, jr.,	L.S.,	South Bethlehem.
Charles Augustus Luckenbach, jr.,	Tech.,	Bethlehem.
Horace Andrew Luckenbach,	Tech.,	Bethlehem.
Joseph David Luckenbach,	Tech.,	Bethlehem.
Frank Paret Magee,	Tech.,	Groveland, N. Y.
William Sprague Maharg,	Tech.,	Bethlehem.
Joseph Henry McGee,	Tech.,	South Bethlehem.
Paul Douglass Millholland,	Tech.,	Reading.
Robert Adam Nagle,	Clas.,	Lower Saucon.
Lucius Holley Norton,	Tech.,	Bridgeport, Conn.
Thomas John Quigney,	Sci.,	South Bethlehem.
Henry Gerber Reist,	Tech.,	Florin.
Edward E. Reynolds,	Tech.,	Pittston.
Joseph William Richards,	Tech.,	Philadelphia.
George Mann Richardson,	Tech.,	St. Louis, Mo.
Frederick Robinson, jr.,	Tech.,	Lancaster.
Augustus Stoughton Ross,	Tech.,	Philadelphia.
George Arthur Ruddle,	L.S.,	Manch Chunk.
William Heysham Sayre, jr.,	Tech.,	South Bethlehem.
John Alexander Schmidt,	Tech.,	Ilion, N. Y.

	COURSE.	RESIDENCE.
John Warwick Scull,	Tech.,	Philadelphia.
Alexander Provost Shaw,	Tech.,	Washington, D. C.
John Bernard Simon, jr.,	Tech.,	Harrisburg.
Francis Timothy Smith,	Tech.,	Simsbury, Conn.
John Henry Spengler,	Tech.,	Bethlehem.
Edward Stanton Stackhouse,	Tech.,	Shickshinny.
Edward Eckert Stetson,	Tech.,	New York City,
Charles Burgess Stevens,	Tech.,	Hartford, Conn.
Richard Garth Stevens,	Tech.,	New York City.
Theodore Stevens,	Tech.,	Philadelphia.
Harry Eugene Stout,	Tech.,	Audenried.
Emerson Hamilton Stowell,	Tech.,	Oswego, N. Y.
Joseph Kiddoo Surls,	Tech.,	Beaver Falls.
William Patterson Taylor,	Clas.,	Tamaqua.
John Milton Thatcher,	Tech.,	Westport, Mo.
Thomas Thomas,	Tech.,	Pittston.
Harry Toulmin,	Sci.,	Bethlehem.
Priestly Toulmin,	Tech.,	Bethlehem.
Edward Powers Vankirk,	Tech.,	Elizabeth.
Curtis Hussey Veeder,	Tech.,	Eddyville, Iowa.
Robert Lee Whitehead,	Tech.,	Amherst C. H., Va.
Thomas John Williams,	Tech.,	Nanticoke.
Hugh Washington Wilson,	Tech.,	Washington.

SPECIAL STUDENTS.

	COURSE.	RESIDENCE.
✓ Henry M. Byllesby,	M.E.,	New York City.
Clarence Reed Laird,	C.E.,	Wheeling, W. Va.
✓ James Lorraine McLenegan,	A.C.,	Reading.
Albert Foster Moon,	C.E.,	Covington, Ga.
✓ Eben Miltimore Morgan,	A.C.,	Reading.
J. Lavington Morgan,	A.C.,	Phoenixville.
✓ George Reginald Radford,	A.C.,	Washington, D. C.
James Edward Talmage,	A.C.,	Provo City, Utah.
William James Brown Walker,	E.M.,	Mansfield.
✓ Rollin Henry Wilbur,	L.S.,	South Bethlehem.

SUMMARY OF STUDENTS.

Graduates,	5
Fifth year Students,	2
Seniors,	30
Juniors,	25
Sophomores,	35
Freshmen,	80
Specials,	10
Total,	187

SUMMARY OF STUDENTS BY STATES.

Massachusetts,	3
Rhode Island,	1
Connecticut,	4
New York,	12
New Jersey,	4
Pennsylvania,	125
Delaware,	1
Maryland,	2
District of Columbia,	8
Virginia,	2
West Virginia,	1
Georgia,	4
Louisiana,	2
Ohio,	4
Illinois,	1
Iowa,	3
Missouri,	2
Tennessee,	1
Kansas,	1
Utah,	2
Mexico,	1
Nicaragua,	1
England,	1
Spain,	1
Total,	187

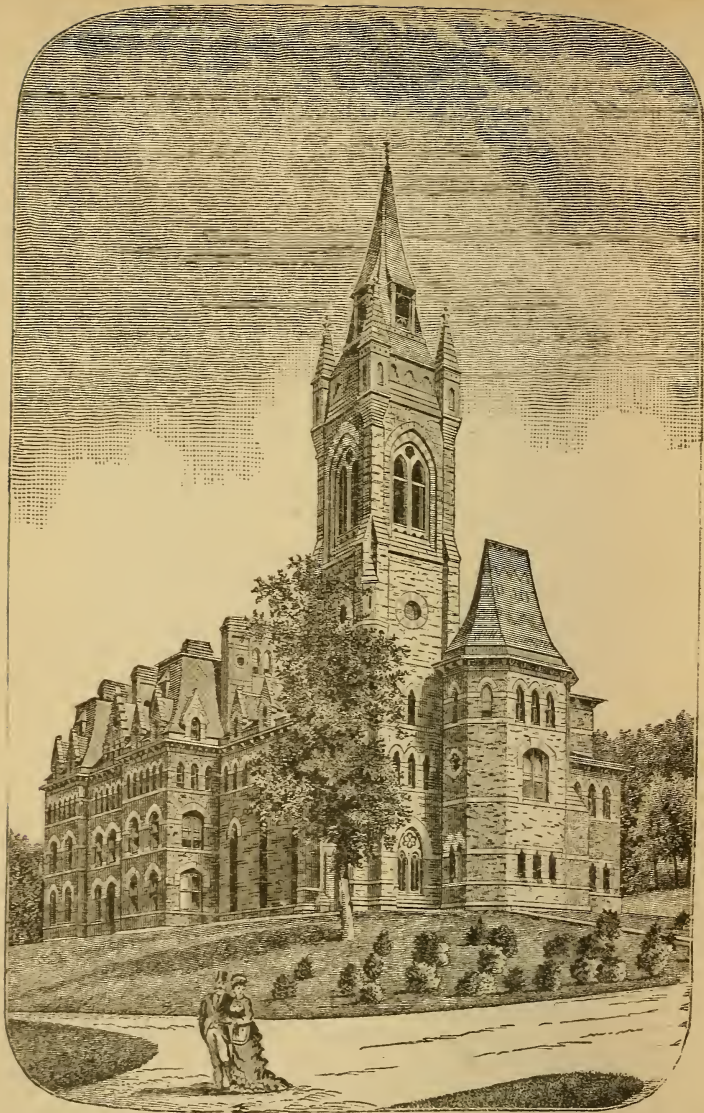
SUMMARY OF STUDENTS BY COURSES.

SCHOOL OF GENERAL LITERATURE.

Classical Course,	15
Latin Scientific Course,	8
Scientific Course,	8
	<hr/> 31

SCHOOL OF TECHNOLOGY.

Course in Civil Engineering	57
Course in Mining Engineering,	46
Course in Mechanical Engineering,	32
Course in Analytical Chemistry,	20
Course in Metallurgy,	1
	<hr/> 156
Total,	<hr/> 187



PACKER HALL.

THE LEHIGH UNIVERSITY.

ORIGIN.

The Hon. ASA PACKER of Mauch Chunk during the year 1865, appropriated the sum of Five Hundred Thousand Dollars, to which he added one hundred and fifteen acres of land in South Bethlehem, to establish an educational Institution in the rich and beautiful Valley of the Lehigh. From this foundation rose THE LEHIGH UNIVERSITY, incorporated by the Legislature of Pennsylvania in 1866. In addition to these gifts, made during his lifetime Judge Packer by his last will secured to the University an endowment of \$1,500,000, and to the University Library one of \$500,000.

DESIGN.

The original object of Judge Packer was to afford the young men of the Lehigh Valley a complete technical education for those professions which had developed the peculiar resources of the surrounding region. Instruction was to be liberally provided in Civil, Mechanical and Mining Engineering, Chemistry, Metallurgy, and in all needful collateral studies. French and German were made important elements in the collegiate course. A School of General Literature was part of the original plan, together with tuition in the ancient Classics. The Institution was freely opened to pupils from every part of the country and the world.

FREE TUITION.

It will be observed that all these educational facilities are provided without charge. Through the generosity of the Founder, the Trustees were enabled, in 1871, to declare tuition FREE in all branches and classes. The Lehigh University is open to young men of suitable talents and training from every part of our own land and of the world.

To this fact the attention of the pupils of our public schools and of the graduates of classical institutions is especially called. Thus is offered *without charge*, every facility for studying the professions of the Civil, Mechanical and Mining Engineer, and of the Metallurgist and Analytical Chemist. In the Classical and Scientific departments of the School of General Literature instruction is given to those who wish to become lawyers, clergymen, physicians, editors, or merchants.

PUBLIC WORSHIP.

Prayers are held in the Chapel every morning and all students are required to be present.

Divine Service is held on every Sunday morning, according to the forms of the Protestant Episcopal Church, in the Chapel of the University. Attendance at this service is required of every student, except in case of those connected with other religious bodies, to whom the President will grant permission at the beginning of each term (if requested by the parent or guardian, or by the student himself if he be 21 years of age) to attend during that term the place of worship of the body with which he is connected, where attendance on Sunday morning will be required.

SITE.

The situation of the Institution is healthful and beautiful. The region is famous for its railway and manufacturing enterprises; it possesses some of the richest iron and coal mines in our land, and thus gives the students rare facilities for confirming the teachings of the recitation room by the observation of the eye.

The University Buildings are about a half-mile from the depot, at the junction of the Lehigh Valley and North Pennsylvania Railroads. New York is ninety-two, and Philadelphia fifty-four miles distant.

BUILDINGS.

PACKER HALL,

named after the Founder, stands seven hundred feet back of Packer Avenue, at the base of the South Mountain. Built of handsome

stone, it presents to the north a noble and imposing front. At the western extremity is a belfry tower containing the President's room and the archive room. The eastern end is a large advanced wing in which are lecture and recitation rooms, and also a thoroughly equipped chemical laboratory. The central portion, eighty feet long, contains the Chapel, Drawing Room and Cabinets.

THE UNIVERSITY LIBRARY.

To the east of Packer Hall stands the University Library, erected by the Founder in memory of Mrs. Lucy Packer Linderman, his daughter.

THE NEW GYMNASIUM,

which will be ready for use by March 1st, 1883, is a handsome and spacious structure, built and equipped with the utmost thoroughness. It will be furnished with the best patterns of apparatus, adjustable to the physical powers of the student.

The bathing arrangements will be complete, and the dressing accommodations ample. Opportunities for recreative exercises will be provided in the bowling-alley, billiard, rowing, fencing and sparring rooms.

It will be placed under the care of a competent Director, who will give instruction in classes and also to meet the special wants of each individual.

THE SAYRE OBSERVATORY.

Near Brodhead Avenue is the Sayre Observatory, the gift of Robert H. Sayre, Esq., of South Bethlehem, containing an equatorial and a zenith telescope, transit instrument and astronomical clock.

OTHER BUILDINGS.

To the west, within the grounds, are the houses of the President and Professors, comports in architecture with Packer Hall. Fronting on Packer Avenue stand Christmas Hall and Saucon Hall, commodious brick edifices, heated by steam and lighted by gas, containing students' rooms, and a mess hall.

EXPENSES.

Tuition is FREE in all branches and classes. Books, materials, paper, pencils, chemical materials used in the analytical laboratory and drawing instruments, are furnished by the student.

Rooms and board can be had in University buildings, under the following rules:

1. The room-rent, for each term, must be paid in advance to the Treasurer of the University. The price for board must also be paid monthly in advance.

2. The charge for board and room-rent shall be \$5 per week. Where two students occupy a room jointly, the charge shall be \$4.50 per week for each.

The charge for board shall be \$4 per week. The charge for room without board shall be \$2 per week for each room.

These prices include gas and heat.

3. The choice of rooms shall be in the order of the classes; in any class the first applicant to have the first choice.

4. Students may retain their rooms from year to year by giving notice of their intention so to do at the close of the academic year, and by procuring their tickets therefor on or before the first day of the next term.

5. Students are required to keep their rooms in order, or to employ some proper person to do so for them.

6. No furniture for rooms will be provided by the University.

7. The use of kerosene, coal oil or burning fluid, in any of the buildings, is prohibited.

The following is an estimate of the necessary expenses for the collegiate year, clothing and traveling not included.

Board for 40 weeks	from \$160 to \$200
Room rent, with fuel and lights	40 " 80
Care of room and use of furniture	5 " 20
Washing and incidentals	15 " 30
Books, stationery, etc.	20 " 45
Total	<u>\$240 to \$375</u>

NOTE.—If clubs be formed the cost of board need not exceed \$3.50 per week.

ADMISSION OF STUDENTS.

Application for admission into the University should be made to the President, from whom all information may be obtained.

ADMISSION TO FRESHMAN CLASS.

Candidates for the Freshman class will be examined in 1833 on Friday and Saturday, June 15 and 16, and on Monday and Tuesday, September 3 and 4. The examinations are oral and rigorous. All candidates must be at least sixteen years of age, must present testimonials of good moral character, and satisfactorily pass in the following subjects:

1. *English Grammar*, including composition, spelling, and punctuation. It is recommended that candidates have a knowledge of Latin Grammar, although an examination in it is not required for any course except the Classical and the Latin-Scientific.

2. *Geography*, general and political.

3. *History of the United States*, including the *Constitution*.

4. *Physical Geography*, Mitchell's or Guyot's, or an equivalent.

5. *Arithmetic*, including the metric system of weights and measures.

6. *Algebra*, Fundamental Principles. Factoring. Least Common Multiple. Greatest Common Divisor. Fractions. Involution. Evolution. Radicals. Imaginary Quantities. Equations of the First and Second Degrees. Ratio. Proportion and Progressions.

Olney's University Algebra is recommended, as it is the text book used in the University.

7. *Geometry*, Fundamental Principles. Rectilinear Figures. The Circle. Proportional Lines and Similar Figures. Comparison and Measurement of the Surfaces of Rectilinear Figures. Regular Polygons. Measurement of the Circle. Maxima and Minima of Plane Figures. The Plane and Polyhedral Angles.

Chauvenet's Geometry, (six books) is recommended, as it is the text-book used in the University.

Candidates for the Latin-Scientific and the Classical Courses are also examined in

8. *Latin Grammar*, (Harkness, or Allen and Greenough preferred)

9. *Cæsar*, four books of the Gallic war.

10. *Cicero*, six orations, including the four against Cataline.

11. *Virgil*, the *Bucolics* and the first six books of the *Aeneid*, including *Prosody*.

12. The translation, at sight, of passages from *Cæsar* and *Cicero*.

13. The translation of English into Latin (As special importance is given this part of the examination, it is suggested to teachers that they connect exercises in making Latin, both oral and written with all the studies of the preparatory course).

14. *Roman History*, Creighton's *Primer of Roman History* is suggested as indicating the amount required.

Candidates for the Classical course are also examined in

15. *Greek Grammar*, (Goodwin's preferred).

16. *Xenophon*, *Anabasis*, four books

17. *Homer*, *Iliad*, three books including *Prosody*.

18. The translation, at sight, of a passage from some work of *Xenophon*.

19. *Greek History*, Fyffe's *Primer of Greek History* is suggested.

20. Writing Greek with accents.

The pronunciation of Greek according to the written accents is followed in the University, and it is desirable that students preparing to enter be taught this system.

REGULAR STUDENTS.

All applicants for regular standing in the classes or schools must be prepared to pass an examination according to the programme of studies. A student may be admitted at any time if able to pass a satisfactory examination in the studies already pursued by the class that he purposes to enter. The only exception will be in the case of a young man who is very nearly but not thoroughly prepared to enter in full standing and who may, at the discretion of the Faculty, be admitted conditionally, to make up his deficiencies by extra study. When they are made up, he will be received in full standing into his class.

SPECIAL STUDENTS.

Young men who do not desire to take a full regular course may enter, upon a satisfactory examination, and select special shorter courses, with the sanction of the Faculty.

PROGRAMME OF STUDIES,

SHOWING THE NUMBER OF EXERCISES PER WEEK FOR EACH
SUBJECT, AND THE TEXT-BOOKS USED.

The following is presented as the general programme of instruction, subject to such modifications from time to time as the Faculty may deem expedient, with the approval of the Trustees.

The names of the text-books studied are generally mentioned. The number of exercises per week in each subject is indicated by the figure in parenthesis immediately following.

Two hours of Drawing, three of work in the Laboratory, or three of practice in the field, are regarded as equivalent to a recitation or lecture of one hour's duration.

During the year, Prof. Ringer will deliver a course of lectures on the History of Europe, from the Congress of Vienna in 1815 to the Congress of Berlin in 1878.

THE SCHOOL OF GENERAL LITERATURE.

This school is intended to correspond to the course long established in our older colleges, modified by the needs and requirements of modern culture. Its object is to impart a comprehensive and liberal education to those who design to enter upon professional rather than technical pursuits.

It comprises three distinct courses: I. The Classical Course, or Course in Arts; II. The Latin-Scientific Course, or Course in Philosophy; III. The course in Science and Letters.

THE CLASSICAL COURSE.

This course is chiefly designed for those who purpose to study Law and Theology; it includes full and rigorous instruction in the Ancient Classics, in Elementary Science and in General Literature. The study of Mathematics in this course embraces Algebra, Geometry, Trigonometry, Analytical Geometry, and the Calculus. The programme includes Physics, Chemistry and Elementary Mechanics. There are full courses in History, in the Science of Language and in the origin and growth of the English Language. There are also lectures on Psychology, the Christian Evidences, International and Constitutional Law and Political Economy. Lectures on Eng-

lish Literature are supplemented by critical readings of the standard English authors. The graduate in this course obtains the degree of Bachelor of Arts (B.A.)

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Geometry (Chauvenet) completed. (5)

Physics.—Mechanics with lectures. (2)

History.—Outlines of the World's History. (2)

Greek.—Homer: Odyssey. Prosody. Testament. History: Smith. (4)

Latin.—Livy. Prose Composition. History: Leighton. (4)

Physiology and Health.—Lectures.

Essays and Declamations.

SECOND TERM.

Mathematics.—Olney's University Algebra, Pt. III. Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (5)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

History.—Outlines of the World's History. (2)

Greek.—Xenophon: Memorabilia of Socrates. Testament. History. (4)

Latin.—Cicero: Essays and Letters. Horace: Odes and Epodes. Composition, Prosody and History. (3)

Essays and Declamations.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry. Olney's General Geometry. (4)

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (4)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity, with Lectures and Laboratory Practice. (3)

Greek.—Felton's Greek Historians. (3)

Latin.—Tacitus: Agricola and Germania. Composition. History. (3)

Essays and Declamations.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Optics and Acoustics, with Lectures and Laboratory Practice. (5)

English.—Coppée's Rhetoric, with Kellogg's Praxis. (2)

Greek.—Euripides: Medea. Greek Antiquities: Mahaffy. (3)

Latin.—Quintilian: Book X. Horace: Satires and Epistles. Composition. (3)

Essays and Declamations.

JUNIOR CLASS.

FIRST TERM.

History.—Ancient History: Thalheimer. (3)

Philosophy.—Coppée's Logic. (2)

English.—Coppée's English Literature. (3)

French.—Grammar. Written and Oral Translations. Chapsal: Litterature Française. (3) Or *German*.—Grammar. Translation from German into English and *vice versa*. (3)

Greek.—Sophocles: Electra. Antiquities. (3)

Latin.—Plautus and Terence. Roman Antiquities: Wilkins. (3)

Essays and Original Orations.

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Psychology. Porter's Elements of Intellectual Science. (2) Political Economy. (1)

English.—English Philology. Schele De Vere. (2)

French.—Grammar. Written and Oral Translations. Chapsal: Litterature Française. (3) Or *German*.—Systematic Reading of various authors. Translation. Dictation. (3)

Greek.—Aristophanes: Clouds. Mahaffy's History of Greek Literature. (3)

Latin.—Juvenal and Persius. Pliny: Select Epistles. Cruttwell's History of Roman Literature. (3)

Essays and Original Orations.

SENIOR CLASS.

FIRST TERM.

International Law.—Lectures: Woolsey. (2)

History.—Decline and Fall of the Roman Empire: Gibbon. (3)

Philosophy.—History of Philosophy: Ueberweg. (2)

Astronomy.—Newcomb's Treatise with Lectures. (3)

French.—Grammar. Systematic Readings of various authors. Dictation. Compositions. (3) Or *German*.—Systematic Readings. German Compositions. Lectures on German Literature. (3)

Latin.—Lucretius, with Lectures. Roman Literature. (2)

Greek.—Pindar: Selected Odes. Greek Literature. (2)

Essays and Original Orations.

SECOND TERM.

Constitutional Law.—Lectures. (1)

History.—History of France. (2)

Philosophy.—Moral Philosophy and Christian Evidences. (2)
Philosophy of History. Lectures. (2)

French.—Systematic Readings. Compositions. Lectures in French on French Literature. Demogeot: Litterature Française. (3) Or *German*.—Systematic Readings. German Composition. Lectures in German on German Literature. Scherr: Geschichte der deutschen Literatur. (3)

Geology.—Lectures. Dana (2).

Latin.—Catullus, Tibullus and Propertius. Cicero: de Officiis, with Lectures. Roman Literature (completed). (2)

Greek.—Demosthenes: Public Orations. Greek Literature (completed). (2)

Lectures on American and English Literature. (2)

Preparation of Thesis.

THE LATIN-SCIENTIFIC COURSE.

The Latin-Scientific Course leading to the degree of Bachelor of Philosophy (Ph.B.) is based on Latin, without Greek, and designed for those who prefer studies of a philosophical nature.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Geometry (Chauvenet) completed. (5)

Physics.—Mechanics with Lectures. (2)

History.—Outlines of the World's History. (2)

German. Otto's Grammar. Writing in German Text. Translation into English. (4)

Latin—Livy. Prose Composition. History: Leighton. (4)

Physiology and Health.—Lectures.

Essays and Declamations.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. Plane and Spherical Trigonometry and Mensuration. Use of the Logarithmic Tables. (5)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

History.—Outlines of the World's History. (2)

German.—Otto's Grammar. Translations: Ahn's Second German Reader. (4)

Latin.—Cicero: Essays and Letters. Horace: Odes and Epodes Composition, Prosody and History. (3)

Essays and Declamations.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (4)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity, with Lectures and Laboratory Practice. (3)

German.—Otto's Grammar. Translations from German into English. (2)

French.—Languillier and Monsanto's Practical French Course. Keetel's Analytical Reader. (1)

Latin—Tacitus: Agricola and Germania. Composition. History. (3)

Essays and Declamations.

SECOND TERM.

Mathematics—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Optics and Acoustics, with Lectures and Laboratory Practice. (5)

English.—Coppée's Rhetoric, with Kellogg's Praxis. (2)

German.—Systematic Readings of various authors. Translation. Dictation. (2)

French.—Languillier and Monsanto's Practical French Course. Keetel's Analytical Reader. Translation. (1)

Latin.—Quintillian: Book X. Horace: Satires and Epistles. Composition. (3)

Essays and Declamations.

JUNIOR CLASS.

FIRST TERM.

History.—Ancient History: Thalheimer. (3)

Philosophy.—Coppée's Logic. (2)

English.—Coppée's English Literature. (3)

French.—Wall's Students' Grammar. Oral Translation from French into English. Written Translation from English into French. Chapsal: Litterature Française. (3)

German.—Systematic Reading of various authors. Compositions in German. (2)

Latin.—Plautus and Terence. Roman Antiquities: Wilkins. (3) Sight Reading and Conversation. (1)

Essays and Original Orations.

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Psychology. Porter's Elements of Intellectual Science. (2) Political Economy. (1)

English.—English Philology. Schele De Vere. (2)

French.—Wall's Students' Grammar. Written and Oral Translations. Chapsal: Litterature Française. Dictation. (3)

German.—Systematic Reading of various authors. Compositions in German. (2)

Latin.—Juvenal and Persius. Pliny: Select Epistles. Cruttwell's History of Roman Literature. (3)

Biology.—Nicholson. (1)

Essays and Original Orations.

SENIOR CLASS.

FIRST TERM.

International Law.—Lectures: Woolsey. (2)

History.—Decline and Fall of the Roman Empire. (3)

Philosophy.—History of Philosophy: Ueberweg. (3)

Astronomy.—Newcomb's Treatise, with Lectures. (3)

French.—Grammar. Systematic Reading of various French authors. Dictation. Composition. (3)

Latin.—Lucretius, with Lectures. Roman Literature. (2)

German.—Systematic Readings of various German authors (continued). Lectures on German Literature. Scherr: Geschichte der deutschen Literatur. (1)

Essays and Original Orations.

SECOND TERM.

Constitutional Law.—Lectures. (1)

History.—History of France. (2)

Philosophy.—Moral Philosophy and Christian Evidences. (2)

Philosophy of History. Lectures. (2)

Geology.—Lectures. Dana. (2)

Latin.—Catullus, Tibullus and Propertius. Cicero: de Officiis with Lectures. Roman Literature (completed). (2)

French.—Systematic Readings. Conversation. Lectures in French on French Literature. Demogeot: Litterature Française. (3)

Lectures on American and English Literature. (2)

German.—Lectures on German Literature. Scherr: Geschichte der deutschen Literatur. (1)

Preparation of Thesis.

THE COURSE IN SCIENCE AND LETTERS.

The Course in Science and Letters, leading to the Degree of Bachelor of Science (B.S.), is designed for those who wish to pursue both Scientific and Literary studies without Latin and Greek. These being omitted, extended instruction is given in French and German, History, General Literature, Mathematics and General Science.

FRESHMAN CLASS.

FIRST TERM.

Mathematics.—Geometry (Chauvenet) completed. (5)

Physics.—Mechanics, with Lectures. (2)

History.—Outlines of the World's History. (2)

English.—Rhetorical Praxis: Kellogg, with Essays and Declamations. (2)

German.—Otto's Grammar. Writing in German Text. Translation into English. (4)

Drawing.—Elementary projections, shading and lettering. (2)

Physiology and Health.—Lectures.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. Plane and Spherical Trigonometry and Mensuration. Use of the Logarithmic Tables. (5)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

History.—Outlines of the World's History. (2)

German.—Otto's Grammar. Translations: Ahn's Second German Reader. (4)

Botany.—Lectures and Laboratory Work. Gray. (1)

Drawing.—Projection Drawing. Elements of Descriptive Geometry. (2)

Essays and Declamations.

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Chemistry.—Lectures and Laboratory Practice. Galloway's Qualitative Analysis. (5)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity, with Lectures and Laboratory Practice. (3)

German.—Otto's Grammar. Translations from German into English. (2)

French.—Languillier and Monsanto's Practical French Course. Keetel's Analytical Reader. (1)

Zoology.—Lectures and Laboratory work (vertebrates): Huxley. (2)

Essays and Declamations.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Optics and Acoustics, with Lectures and Laboratory Practice (5)

English.—Coppée's Rhetoric, with Kellogg's Praxis. (2)

German.—Systematic Readings of various authors. Translation. Dictation. (2)

French.—Languillier and Monsanto's Practical French Course. Keetel's Analytical Reader. Translation. (1)

Zoology.—Lectures and Laboratory work (vertebrates and invertebrates). Huxley. (3)

Essays and Declamations.

JUNIOR CLASS.

FIRST TERM.

History.—Ancient History: Thalheimer. (3)

Philosophy.—Coppée's Logic. (2)

English.—Coppée's English Literature. (3)

French.—Wall's Students' Grammar. Oral Translation from French into English. Written Translation from English into French. Chapsal: Litterature Française. (3)

German.—Systematic Reading of various authors. Compositions in German. (2)

Crystallography.—Lectures with Practical Exercises in the determination of Crystals. (2)

Mathematics.—Integral Calculus: Courtenay. (2)

Essays and Original Orations.

SECOND TERM.

History.—History of England: Hume. (3)

Philosophy.—Psychology. Porter's Elements of Intellectual Science. (2) Political Economy. (1)

English.—English Philology. Schele De Vere. (2)

French.—Wall's Students' Grammar. Written and Oral Translations. Chapsal: Litterature Française. Dictation. (3)

German.—Systematic Reading of various authors. Compositions in German. (2)

Mineralogy.—Descriptive Mineralogy, with practical exercises in the determination of Minerals. (3)

Biology.—Nicholson. (1)

Essays and Original Orations.

SENIOR CLASS.

FIRST TERM.

International Law.—Lectures: Woolsey. (2)

History.—Decline and Fall of the Roman Empire. (3)

Philosophy.—History of Philosophy: Ueberwæg. (2)

Astronomy.—Newcomb's Treatise, with Lectures. (3)

French.—Grammar. Systematic Reading of various French authors. Dictation Composition. (3)

Geology.—Lithology and Laboratory Practice Formation of Strata. General Definitions of Geology. (3)

German.—Systematic Readings of various German authors (continued). Lectures on German Literature. Scherr: Geschichte der deutschen Literatur. (1)

Essays and Original Orations.

SECOND TERM.

Constitutional Law—Lectures. (1)

History—History of France. (2)

Philosophy—Moral Philosophy and Christian Evidences. (2)
Philosophy of History. Lectures. (2)

French.—Systematic Readings. Conversation. Lectures in French on French Literature. Demogeot: Litterature Française. (3)

Geology—Historic, Dynamic and Economic Geology. (4)

Lectures on American and English Literature. (2)

German.—Lectures on German Literature. Scherr: Geschichte der deutschen Literatur. (1)

Preparation of Thesis

THE SCHOOL OF TECHNOLOGY.

This school includes four distinct courses: I. The Course in Civil Engineering; II. The Course in Mechanical Engineering; III. The Course in Mining and Metallurgy; IV. The Course in Chemistry. These have the same curriculum of studies for the first three terms (one year and a half). At the end of that time the student selects his course and follows its programme.

FRESHMAN CLASS.

FIRST TERM.

Mathematics—Chauvenet's Geometry, (completed). (5)

Physics.—Mechanics, with Lectures. (2)

German—Otto's Grammar. Writing in German Text. Translations into English. (4) Or *French.*—Fasquelle's Introductory Course. Chouquet's Reader. (4)

Drawing.—Elementary Projections, Shading and Lettering. Free-hand Drawing. (4)

English.—Exercises and Declamations. (2)

Physiology and Health.—Lectures.

SECOND TERM.

Mathematics.—Olney's University Algebra, Part III. (3) Plane and Spherical Trigonometry and Mensuration. Use of Logarithmic Tables. (2)

Chemistry.—Lectures. Fownes' Elementary Chemistry. (3)

German.—Otto's German Grammar. Translations. Ahn's Second German Reader. (4) Or *French*.—Languillier and Monsanto's Practical French Course. Translations. Keetel's Analytical Reader. (4)

Botany.—Lectures and Practice. Gray. (1)

Drawing.—Projection Drawing. Descriptive Geometry. (2)

English.—Exercises and Declamations. (2)

SOPHOMORE CLASS.

FIRST TERM.

Mathematics.—Analytical Geometry: Olney's General Geometry. (4)

Chemistry.—Lectures and Laboratory Practice: Galloway's Qualitative Analysis. (5)

Physics.—Heat, Meteorology, Magnetism and Statical Electricity with Lectures. Laboratory Practice in these branches and Mechanics. Barometrical leveling and Measurement of heights. (3)

German.—Otto's Grammar. Oral Translations. Ahn's Reader. (2) Or *French*.—Languillier and Monsanto's Practical French Course. Translations. Keetel's Analytical Reader. (2)

Drawing.—Isometric Drawing. Architectural Drawing. (2)

English.—Essays and Declamations. (1)

THE COURSE IN CIVIL ENGINEERING.

The special studies in this course may be grouped under the heads of surveying, applied mechanics and construction. The work in surveying extends over five terms and embraces land surveying, leveling, topography, triangulation, hydrography, railroad recon-

naissance and location, mine surveying and the elements of geodesy. Much time is devoted to actual practice in the field and drafting room, each student being required to handle the various instruments and take notes for profiles and maps. The work in applied mechanics comprises the strength and elasticity of materials, the theory of the equilibrium of arches, roofs and bridges, the mechanics of machinery, hydraulics and hydraulic motors. Here the theoretical principles are illustrated by examples and problems drawn from actual engineering practice. The work in construction familiarizes the student with the qualities of materials, with masonry and foundations, the different forms of bridges, the methods employed in the building of roads and railroads, and with the arrangement of systems of water supply and sewerage. Visits of inspection to the engineering works in the Lehigh Valley and vicinity are regularly made. Plans, drawings, and estimates of cost are prepared by each student for the construction of a line of railroad, and also for a pier arch, and a Howe truss bridge.

Besides these special studies there is a course in astronomy which includes practical work in the observatory. The study of English and of French or German is continued, and instruction is given in mineralogy, lithology and geology.

The student who completes all the studies of this course will receive the degree of Civil Engineer (C. E.)

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Acoustics, Light, with Lectures and Laboratory Practice. (5)

German.—Systematic Readings. Translation. Dictation. (2)
Or *French.*—Wall's Students' Grammar. Systematic Readings. Dictation. (2)

Drawing.—Line Shading. Sketching. Drawing of Structures from actual measurement. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles and Contour Maps. (3)

Essays and Declamations.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

German.—Systematic Readings. Lectures on Syntax. Compositions in German. (2) Or *French*.—Readings. Translation. Dictation. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in General. Statics. Dynamics, and Statics of Fluids. Lectures on the Theory of Centre of Gravity and Moment of Inertia. (5)

Surveying.—Triangulation. Leveling. Topographical Surveys and Maps. (4)

Construction.—Materials of Construction. Carpentry. Masonry. Foundations. Descriptions of Structures. (2)

Crystallography.—Lectures, with practical exercises in the determination of crystals. (2)

Essays and Declamations.

SECOND TERM.

German.—Systematic Readings. Compositions. (2) Or *French*.—Systematic Readings. Compositions. (2)

Strength of Materials.—Elasticity and strength of wood, stone, and metals. Theory of columns, shafts, and beams. Testing of materials. (3)

Surveying.—Railroad Reconnoissance and Location. Survey of a Line, with profile, map and estimate of cost. (4)

Construction.—Drawings for Piers and Arches. Construction and maintenance of Roads and Railroads. Theory of retaining walls and arches. (5)

Mineralogy.—Descriptive Mineralogy, with practical exercises in the determination of minerals. (3)

Essays and Original Orations.

SENIOR CLASS.

FIRST TERM.

Astronomy.—Descriptive Astronomy. (3)

Graphical Statics.—Analysis of roof trusses and arches. (2)

Surveying.—Use of plane table and sextant. Hydrographic surveys and charts. Gauging of streams. (3)

Mechanics of Machinery.—Pile drivers, cranes and elevators. The locomotive. (2)

Roofs and Bridges.—Theory and calculation of strains in trusses. Study of bridge details. Reports on stability of bridges. Design for a railroad bridge. (5)

Geology.—Lithology, with practical exercises in determining rocks. (2)

SECOND TERM.

Astronomy.—Practical Astronomy as applied to Geodesy and Navigation. Lectures and Observatory work. Determination of Latitude, Longitude and Azimuth. Practice with the Sextant, Transit and Zenith Telescope. (2)

Surveying.—Mine Surveying, with practical work. Elements of geodetic surveying. (2)

Hydraulics.—Hydrostatics. Flow of water in pipes and rivers. Hydraulic motors. (2)

Construction.—Water supply engineering and sewerage. Specifications and Contracts, with designs and estimates for engineering projects. (5)

Geology.—Historic and dynamic. Dana. (2)

English Literature.—Lectures. (2)

Christian Evidences.—Lectures. (1)

Preparation of Thesis.

THE COURSE IN MECHANICAL ENGINEERING.

The object of this course is the study of the Science of Machines; the principal subjects taught are: the nature, equivalence and analysis of mechanisms, the mechanics or theory of the principal classes or types of machinery, Mechanical Technology and the principles and practice of Machine Design.

That the students may obtain the practical engineering data which they will most need when beginning their work as mechanical engineers, they are required to pursue a course of Shop Instruction which does not necessarily involve manual labor and manipulation of tools but is principally devoted to familiarizing them with those

points in pattern-making, moulding, forging, fitting and finishing, which they need to know as designers of machinery. Particular attention is therefore directed to the forms and sizes of machine parts that can be readily constructed in the various workshops, to the time that it takes to perform and the order of the various operations, to the dimensions most needed by workmen (in order that the students may learn to dimension working drawings judiciously) and to the various devices—ordinarily escaping the beginner's notice—for increasing the accuracy of the work, durability of the parts, conveniences of manipulation and safety of the workmen. This involves acquaintance with the processes and machinery of the workshops, but it is the foreman's and superintendent's knowledge which is required rather than the manual dexterity and skill of the workman and tool-hand. The acquirements peculiar to the latter are by no means despised, and students are encouraged to familiarize themselves therewith during leisure hours, but manual work in the shops forms no regular part of the course. On the contrary, the student enters the shop with hands and mind free to examine all the processes, operations and machinery, and ready at any moment at the call of the teacher, to witness an operation of special interest or to examine into the causes of and remedies for any sudden break down. Dressed in overalls and provided with note-book, pencil, calipers and measuring rule, the student sketches the important parts of the various machine-tools, notes down the successive steps of each of the important shop-processes as illustrated by the pieces operated upon, and, having first obtained a clear idea from the working drawings of what is about to be constructed, follows pieces of work through the shops from the pig or merchant form to the finished machine.

That the students may learn to observe carefully and be trained to think and observe for themselves in these matters, there is required of them a full description of the various processes, operations and tools involved in the production of each one of a series of properly graded examples of patterns, castings, forgings and finished pieces which are not being constructed in the shops at the time and the drawings or blue prints for which have been given to them on entering the shops. The student's work is directed not only by these drawings and by the printed programme given him at the start, but also personally by a teacher, who accompanies him into the shops,

gives necessary explanations, and tests the extent and accuracy of his knowledge by examining the sketches and notes, and by frequent questioning. Finally the results of the observations and the sketches made are to be neatly embodied in a memoir.

During the course there are frequent visits of inspection to engineering works, both in and out of town, with special reference to such subjects as Prime Movers, Machinery for lifting, handling and transporting, and Machinery for changing the form and size of materials. It is intended that each of these excursions shall have some definite purpose in view which must be fully reported by the students.

The instruction in Machine Design, during the second term of Junior year, consists in determining rational and empirical formulas for proportioning such machine parts as come under the head of fastenings, bearings, rotating, sliding and twisting pieces, belt and toothed gearing, levers and connecting rods, also, in comparing recent and approved forms of these same parts with respect to their advantages as regards fitness, ease of construction and durability, and in making full-sized working drawings of these parts; all the dimensions are determined by the students from the above mentioned formulas, the data being given as nearly as possible as they would arise in practice. During the Senior year, the students undertake the calculations, estimates and working drawings involved in the design of a simple but complete machine, each student being engaged upon a different machine. From the finished drawings of each machine, tracings are made and then "blue prints" taken for distribution among the other members of the class. The whole class also take up the design of a steam engine, every dimension being determined by the students, and complete working drawings made. In the case of the simple machines and of the steam engine, the general plan or arrangement will be given to the students in the form of rough sketches, photographs or wood-cuts. This work will continue to the middle of the last term of the Senior year. From this time on the students are expected to make original designs for simple mechanisms, whose object has been fully explained. Throughout the course the work in the draughting room is carried on as nearly as possible like that of an engineering establishment,

and special attention is paid to methods of expediting the work of calculation by means of simple formulas, tables and diagrams.

The graduate in this course will receive the degree of Mechanical Engineer (M. E.)

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Acoustics, Light, with Lectures and Laboratory Practice. (5)

German.—Systematic Readings. Translation. Dictation. (2)
Or *French*.—Systematic Readings. Dictation. (2)

Drawing.—Line Shading. Sketching. Drawing of Machines from actual measurement. (3)

Kinematics of Machinery.—Reuleaux. Nature and Equivalence of Mechanisms. (3)

Essays and Declamations.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

German.—Systematic Readings. Compositions. (2) Or *French*.—Systematic Readings. Compositions. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Mechanical Technology.—Shop instruction. Examination of the processes and appliances involved in pattern making, moulding, forging, fitting and finishing, with sketches and reports. (8)

Essays and Declamations.

SECOND TERM.

German.—Systematic Readings. Compositions in German. (2)
Or *French*.—Systematic Readings. Compositions. (2)

Strength of Materials.—Elasticity and strength of wood, stone and metals. Theory of beams, shafts and columns. Experimental tests. (3)

Steam Engines.—Rigg's Practical Treatise. (2)

Boilers.—Wilson. Strength, construction and wear and tear of boilers. (1)

Machine Design.—Proportioning of such machine parts as come under the head of Fastenings, Bearings, Rotating and Sliding Pieces, Belt and Toothed Gearing, Levers and Connecting Rods. (5)

Metallurgy — Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (4)

Essays and Original Orations.

SENIOR CLASS.

FIRST TERM.

Thermodynamics.—General principles; application to Steam Engines and Air Compressors. (3)

Graphical Statics — Graphical analysis of roof trusses and girders. (2)

Machine Design.—Calculations and working drawings for a High Speed Steam Engine. (5)

Kinematics.—Diagrams of the changes of position, speed and acceleration in mechanisms. Link and valve motions. Quick return motions. Parallel Motions. Laying out of Cams. (3)

Mechanics of Machinery — Weisbach-Herrmann. Hoisting Machinery, Accumulators, Cranes and Locomotives. (4)

SECOND TERM.

Mechanics of Machinery.—Weisbach-Herrman. Pumps, Pumping Engines, Blowing Engines, Compressors and Fans. (4)

Machine Design — Calculations and working drawings for the following machines: Drilling, Shaping, Milling, Shearing and Punching Machines, Hoists, Pumps and Stone Crushers. Original Designs. (5)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels; hydraulic motors. (2)

Measurement of Power.—Indicating of Steam Engines; determination of evaporative efficiency of boilers; dynamometer experiments. (1)

Specifications.—Contracts. Requirements of Patent Office. (1)

English Literature.—Lectures. (2)

Christian Evidences — Lectures. (1)

Preparation of Thesis

THE COURSE IN MINING AND METALLURGY.

In addition to the physics, chemistry, literature, higher mathematics and mechanics necessary to all technical education, the scheme of studies comprises courses in mining, metallurgy, geology, mineralogy, dynamics, qualitative and quantitative analysis, blowpipe analysis, topographical and mine surveying and drawing. On account of the great number and scope of the studies necessary to the completion of this course, it is five years in length.

The graduate in this course will receive the degree of Engineer of Mines (E. M.)

At the completion of the fourth year of this course, the student will receive the degree of Bachelor of Metallurgy (B. M.)

In the course of mineralogy, geology and analytical chemistry, much attention is paid to the practical instruction of the student in determining minerals by their crystallographical and physical properties, and, by the aid of blowpipe analysis, in the determination of rocks; in the qualitative and quantitative examination of ores and metallurgical products and in the rapid methods of assaying ores by the dry and wet ways employed in metallurgical laboratories. The location of the University in the vicinity of the iron works of the Lehigh Valley and especially of the extensive establishment of the Bethlehem Iron Company, affords unusual facilities for the practical study of iron metallurgy. The processes for the manufacture of spelter and oxide of zinc may be studied at the Bethlehem Zinc Works. The facilities for the practical study of mining and economic geology are not excelled by those of any other Institution in the country. The zinc mines at Friedensville and the brown hematite and slate deposits of the Lehigh Valley are in the immediate vicinity, while within easy reach by rail are the anthracite coal fields of Pennsylvania, the iron and zinc mines of New Jersey, and the celebrated iron mines at Cornwall, Pa.

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Acoustics, Optics with Lectures and Laboratory Practice. (5)

German or French.—Systematic Readings. Translation. Dictation. (2)

Assaying—Including the Assay by the dry methods of Gold, Silver, Copper, Lead, Iron and Tin ores. Laboratory Work. Ricketts. (1)

Chemistry.—Quantitative Analyses: Laboratory Work: Fresenius. (5) The following analyses are executed by the students:

1. Iron Wire (Fe)
2. Bronze (Cu, Sn, Zn)
3. Silver Coin (Au, Ag, Pb, Cu)
4. Zinc Ore (Zn) By both Gravimetric and Volumetric Methods.
5. Copper Ore (Cu)
6. Spiegeleisen (Mn)

Essays and Declamations.

JUNIOR CLASS.

FIRST TERM.

Mathematics.—Integral Calculus: Courtenay. (2)

Mechanics.—Smith. Mathematical Theory of Motion. Science of Motion in general. Statics. Dynamics and Statics of Fluids. Barometrical Leveling and Measurement of Heights. Lectures on Theory of Centre of Gravity and Moment of Inertia. (5)

Chemical Philosophy.—Cooke. (5)

German or French.—Systematic Readings. Compositions. (2)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (3) The following analyses are executed by the student:

7. Lead Ore (PbS)
8. Ilmenite (TiO₂)
9. Iron Ore (Complete Analysis)
10. Limestone (Complete Analysis)
11. Coal (Volatile Matter,—Fixed Carbon, Ash, H₂O, S, P)

Essays and Declamations.

SECOND TERM

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (4)

Blow-pipe Analysis—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

Steam Engines.—Rigg's practical treatise (2)

Boilers.—Strength, Construction: Wilson. (1)

Strength of Materials.—Elasticity and strength of wood, stone and metals. Theory of beams, columns and shafts. (3)

Surveying.—Use of Compass, Level and Transit. Maps of Farm Surveys. Profiles and Contour Maps. (3)

German or French.—Systematic Readings. Compositions. (2)

Drawing.—Elements of Machine Design. Plans and Elevations of Furnaces. (1)

Essays and Original Orations.

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (5)

Crystallography.—Lectures with Practical Exercises in the determination of Crystals. (2)

Thermodynamics.—General Principles: Applications to Steam Engines and Air Compressors. (3)

**Mechanics of Machinery.*—Hoisting Machinery, Cranes, Accumulators: Weisbach-Herrmann. (2)

Roofs and Bridges.—Theory and calculation of strains in framed trusses. (3)

**Chemistry.*—Fresenius Quantitative Analysis. (2) The following analyses are executed by the students:

12. Manganese Ore (MnO_2)

13. Mine and Boiler Waters.

14. Boiler incrustations.

SECOND TERM.

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals: E. S. Dana. (3)

Blow-pipe Analysis.—Practice. (1)

Hydraulics.—Hydrostatics. Flow of water in pipes and channels; hydraulic motors (2)

Mechanics of Machinery.—Pumps, Pumping-Engines, Blowing Engines, Compressors and Fans. (4)

* The Chemistry is completed by four exercises a week in the first half of the term. The Mechanics of Machinery is then begun.

Measurement of Power.—Indicator Cards. Determination of Evaporative Efficiency of Boilers. Dynamometer Experiments. (1)

English Literature.—Lectures. (2)

Christian Evidences.—Lectures. (1)

Chemistry.—Fresenius' Quantitative Analysis. (3) The following analyses are executed by the students:

15. Slag (Complete Analysis)

16. Pig Iron (Complete Analysis)

17. Carbon in Steel. (Volumetric.)

18. Nickel Ore (Ni, Co)

19. Gas Analysis (Complete Analysis of Illuminating Gas)

FIFTH YEAR.

FIRST TERM.

Astronomy.—Descriptive Astronomy: Newcomb. (3)

Mining.—Modes of Occurrence of the Useful Minerals. Searching for Mineral Deposits. Examination of Mining Properties. Boring. Mining Tools, Machines and Processes. Timbering and Masonry. Callon. André. (4)

Geology.—Lithology, with practical exercises in determining Rocks. Cotta. Rutley. General Geological Definitions and Principles. Dana. Le Conte. (4)

Zoology.—Lectures. (2)

Surveying.—Triangulation. Leveling. Topographical Surveys and Maps. (4)

SECOND TERM. [TO EASTER.]

Mining.—Methods of Working. Underground Transportation. Hoisting, Drainage and Pumping. Ventilation and Lighting. Mechanical Preparation of Ores. Coal Washing. (3)

Geology.—Historic and Dynamic: Dana. Le Conte. (2)

Economic Geology.—Lectures. (2)

Mine Surveying.—Practice in the Mines. Map Drawing. (2)

Astronomy.—Practical work. (2)

Drawing.—Mining Plant. Systems of Timbering. Geological Maps and Sections. (4)

Projects.—In Mining, Geology and Metallurgy. (2)

SECOND TERM. [AFTER EASTER.]

Astronomy.—Practical work. (2)

Economic Geology.—Lectures. (2)

Notes on mining costs.

Excursions.

Thesis.

THE COURSE IN CHEMISTRY.

This course of instruction continues the subject of Theoretical Chemistry from the general course of the two previous terms, the subject of Chemical Philosophy and Organic Chemistry being taught by daily recitations in the Junior and Senior years.

In Analytical Chemistry, the Course of Qualitative Analysis in the first term of the second year is followed by preparation of Chemical Compounds and purification of Chemicals.

Subsequently, Quantitative Analysis is pursued to the end of the course, including the Dry Assaying of Ores of gold, silver, copper, lead, iron and tin, and the Wet Analyses, included in the appended schedule. In addition, courses of Lectures on Medical, Agricultural and Technical Chemistry are given, and various industrial establishments in the neighborhood and in Philadelphia and New York are visited, in the company of an instructor. The course also includes thorough instruction in Physics and Mechanics, Mineralogy and Blow-pipe Analysis, Metallurgy, Geology and Descriptive Astronomy.

The last term of the Senior year is mainly devoted to the preparation of a Thesis on some subject, selected by the Professor, involving practical work in the Laboratory, in addition to the literary labor, and each graduate will thus make a contribution to the progress of the science as a preliminary to the reception of his degree.

The course is thus seen to include thorough instruction in theoretical and applied chemistry, in their various branches, as well as, in those cognate sciences of such great value to the chemist.

The Laboratories are under the immediate charge of the Professor and his Assistant, and, together with the Lecture-room, are unsurpassed in excellence by any similar establishment in the country, being supplied with all the modern improvements. The collections

of apparatus, specimens and models, illustrating theoretical and applied chemistry, are already important and rapidly increasing.

Students are charged for the chemicals and apparatus consumed. If the student is moderately careful, this expense need not exceed \$60 per year.

The graduate of this course will receive the degree of Analytical Chemist. (A. C.)

SOPHOMORE CLASS.

SECOND TERM.

Mathematics.—Differential and Integral Calculus: Olney. (4)

Physics.—Galvanism, Acoustics, Light: with Lectures and Laboratory Practice. (5)

German.—Systematic Readings. Translations. Dictation. (2)
Or *French*.—Systematic Readings. Translations. Dictation. (2)

Chemical Preparations.—Including the Preparation of Chemical Compounds and the Purification of Chemicals by Distillation, Sublimation, Fusion, Crystallization, Precipitation, etc. (3)

Assaying.—Including the Assay by the dry methods of gold, silver, copper, lead, iron and tin ores. Ricketts. (1)

Blow-pipe Analysis.—Lectures with Practice. Plattner, Brush, or Nason and Chandler. (1)

Essays and Declamations. (1)

JUNIOR CLASS.

FIRST TERM.

Chemical Philosophy.—Cooke. (5)

Toxicology.—Otto on Poisons. (1)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (6)

The following analyses are executed by the students :

1. Iron Wire (Fe)
2. Potassic Dichromate (Cr_2O_3)
3. Baric Chloride (Ba, Cl, H_2O)
4. Magnesian Sulphate (MgO , SO_3 , H_2O)
5. Hydro Di-Sodic Phosphate (P_2O_5)
6. Bronze (Cu, Sn, Zn)
7. Rochelle Salt (K_2O , Na_2O)

8. Volumetric Determination of Chlorine.
9. Acidimetry (HCl , H_2SO_4 , HNO_3)
10. Alkalimetry (KOH , NaOH , NH_4OH).
11. Chlorimetry (Bleaching Powders)
12. Silver Coin (Au , Ag , Pb , Cu)
13. Zinc Ore (Zn)

Crystallography.—Lectures, with Practical Exercises in the Determination of Crystals. (2)

German.—Systematic Readings. Compositions in German. (2)

Or *French*.—Systematic Readings. Compositions. (2)

Anatomy and Physiology.—Lectures. (1)

SECOND TERM.

Organic Chemistry.—Wöhler. (3)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (5)

The following analyses are executed by the student :

14. Copper Ore (Cu)
15. Spiegeleisen (Mn)
16. Lead Ore (PbS)
17. Ilmenite (TiO_2)
18. Iron Ore (Complete Analysis)
19. Limestone (Complete Analysis)
20. Coal (Volatile Matter,—Fixed Carbon, Ash, H_2O , S, P)
21. Slag. (Complete Analysis)

Metallurgy.—Metallurgical Processes. Furnaces. Refractory Building Materials. Combustion. Natural and Artificial Fuels. Metallurgy of Iron. (4)

German.—Systematic Readings. Compositions, in German. (2)

Or *French*.—Systematic Readings. Compositions. (2)

Mineralogy.—Descriptive Mineralogy, with Practical Exercises in the Determination of Minerals. E. S. Dana. (3)

SENIOR CLASS.

FIRST TERM.

Metallurgy.—Of Copper, Lead, Silver, Gold, Platinum, Mercury, Tin, Zinc, Nickel, Cobalt, Arsenic, Antimony and Bismuth. (5)

Quantitative Analysis.—Fresenius' Quantitative Analysis. (9)

The following analyses are executed by the student :

22. Guano (NH_3 , P_2O_5 , H_2O)

23. Clay (Complete Analysis)
24. Manganese Ore (MnO_2)
25. Mineral Water (Complete Analysis)
26. Pig Iron (Complete Analysis)
27. Nickel Ore (Ni, Co)
28. Organic Analysis (C, H, O, N)
29. Gas Analysis (Complete Analysis of Illuminating Gas.)
- Astronomy*.—Descriptive Astronomy: Newcomb. (3)

SECOND TERM.

- Chemistry Applied to the Arts*.—Lectures. (3)
Medical Chemistry.—Lectures (1)
Agricultural Chemistry.—Lectures. (1)
Geology.—Historic, Dynamic and Economic Geology. Lectures.
 Dana. (4)
Christian Evidences.—Lectures. (1)
English Literature and History.—Lectures. (2)
Preparation of Thesis

GRADUATING THESES.

Every student will be required to present a thesis upon some topic connected with his special course, as a necessary portion of the exercises for his final examination for a diploma. These theses shall be accompanied by drawings and diagrams, when the subjects need such illustration. The originals will be kept by the University, as a part of the student's record, for future reference; but a copy may be retained by the student, and be published, permission being first obtained from the President.

DIPLOMAS AND CERTIFICATES.

The Diploma is given only to those who have passed all the examinations in a regular course and is signed by the President and Secretary of the Board of Trustees and by the Faculty of the University. For all partial courses a certificate is given showing what the student has accomplished, and is signed by the President and Secretary of the Faculty.

GRADUATE STUDENTS.

Graduates of the University wishing to remain a year or more and pursue a course of studies as candidates for another degree may do so with the sanction of the Faculty. Graduates wishing to take special courses of study will be afforded every facility in so doing.

POST GRADUATE DEGREES.

A. M.

The Faculty will recommend for the Degree of Master of Arts candidates, otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Arts, shall pursue for at least two years, at the University, a course of liberal study approved by the Faculty, pass a thorough examination on the same, and present satisfactory theses.

Ph. D.

The Faculty will recommend for the Degree of Doctor of Philosophy candidates, otherwise properly qualified, who, after taking at this University either of the Degrees of Civil, Mechanical or Mining Engineer, or Analytical Chemist, shall pursue, for two years, at the University, a course of advanced Scientific study in the line of their profession, pass a thorough examination in the same, and present satisfactory theses.

D. Sc.

The faculty will recommend for the Degree of Doctor of Science candidates, otherwise properly qualified, who, after taking at this University the Degree of Bachelor of Science, shall pursue, for at least two years, at the University, a course of Scientific study, embracing two subjects approved by the Faculty, pass a thorough examination, showing in one of the subjects special attainments, and shall present satisfactory theses in one of the subjects, based upon original scientific investigation.

Candidates for any of the above postgraduates degrees, who are not graduates of this University, must give satisfactory evidence of having fulfilled the requirements for graduation in the corresponding undergraduate course. The acceptance of a certificate as evidence of proficiency, in lieu of examination, is at the discretion of each Professor as to the subjects in his department.

The requirement of residence may be omitted in special cases by the Faculty.



THE UNIVERSITY LIBRARY.

THE UNIVERSITY LIBRARY.

The Library Building was erected by the Founder of the University in 1877, at a cost of One Hundred Thousand Dollars, as a memorial of his daughter, Mrs. Lucy Packer Linderman, and during the same year more than Twenty Thousand Dollars were contributed by the family and friends of that estimable woman, as a memorial fund for the purchase of books. By the will of the Founder of the University a fund of \$500,000 has been given for the permanent endowment of the Library.

The building is semi-circular in plan, with a handsome façade in the Venetian style of architecture. It is constructed of Potsdam sandstone with granite ornamentation. In the interior, the centre is occupied as a reading space, fifty by forty feet, from which radiate the book cases, extending from floor to ceiling; two galleries affording access to the upper cases. Shelf room is now provided for Eighty Thousand Volumes. The building is thoroughly fireproof, well lighted, and heated by steam.

Thirty-four thousand volumes are now upon the shelves, including many extremely valuable works. The list of periodicals numbers about fifty, embracing as far as possible all departments of knowledge.

The Library is conducted strictly for consultation, and is open to the use of the public; both of which conditions are in accord with the terms of the gift.

REGULATIONS OF THE LEHIGH UNIVERSITY LIBRARY.

- I. The Library is open every day, except Sundays and Legal Holidays, from 8 A. M. until 10 P. M.
- II. Admission is free to all persons over 16 years of age.
- III. Readers are required to write their names and addresses in the Daily Register of the Library. They also write the name of the book desired upon a Library Card, with their signatures, and present the same to the Director's Clerk, who supplies the book, retaining the card as a receipt. Before leaving the Library, readers return their books to the clerk, and receive their cards.
- IV. No book is permitted, under any circumstances, to be taken from the Library.

- V. No person is allowed to enter the alcoves, or remove any book from the shelves, without the permission of the Director.
- VI. Readers wishing to consult the more valuable illustrated works make special application for that purpose.
- VII. In taking notes, pencils, and not pens and ink, are to be used.
- VIII. Audible conversation and the use of tobacco are strictly forbidden in any part of the Library.
- IX. Any person not conforming to these Regulations, will be denied the privilege of the Library.
- X. Any person, who defaces, in any way, any book, magazine or paper, or the furniture, or any portion of the building, in addition to being deprived of the privileges of the Library, will be prosecuted according to law.

OBSERVATORY.

By the liberality of Robert H. Sayre, Esq., one of the Trustees of the University, an Astronomical Observatory has been erected on the University grounds, and placed under the charge of the Professor of Mathematics and Astronomy.

In the dome of the observatory is mounted an Equatorial Telescope, of six inches aperture, by Alvin Clark & Sons. The west wing contains a superior Sidereal Clock, by Wm. Bond & Sons; a Zenith Telescope, by Blunt, and a Field Transit, by Stackpole. There is also a Prismatic Sextant, by Pistor & Martins.

Students in practical Astronomy receive instruction in the use of the instruments and in actual observation.

The grounds upon which the observatory stands, consisting of seven acres of land adjoining the original grant, was presented to the University by Charles Brodhead, Esq., of Bethlehem.

An advanced course in Astronomy and the higher Analysis has been established, requiring two years for its completion. It is adapted to the attainments of the graduates of this University, but is open to any one who may be prepared to pursue it.

This course embraces the following subjects:

First Year — Spherical Astronomy. Theory of Instruments. Method of Least Squares Numerical Calculus.

Second Year—Celestial Mechanics. Interpolation and Quadrature. Computation of Orbits and Perturbations.

During the entire course, the student will have ample opportunity to familiarize himself with the practical work of the Observatory and Computing Room.

STUDENTS' SOCIETIES.

THE CHEMICAL AND NATURAL HISTORY SOCIETY.

This Society was organized in the Fall of 1871, as "The Chemical Society," but was afterwards expanded, as its present title indicates, and admits, by election, students from all departments of the University.

The collections of Chemical Preparations, and Botanical and Zoölogical Specimens belonging to the Society, are already important. During the past years persons have been sent to Texas and Brazil to collect specimens for these cabinets.

The Society has organized and maintained several courses of public scientific lectures. Among the honorary members of the Society are more than one hundred of the most distinguished scientists in Europe and the United States.

THE ENGINEERING SOCIETY.

This Society was organized in 1873 and admits by election students in the Junior and Senior Classes. Its meetings are held monthly.

THE LITERARY SOCIETY.

This Society was organized in 1880 and is composed of students from all departments. Its meetings are held semi-monthly.

FOUNDER'S DAY.

On the second Thursday of October of each year Commemorative Exercises are held in honor of the Founder of the University.

On Thursday, October 12th, 1882, the fourth celebration of Founder's Day occurred. In Packer Hall, a service, appropriate to the occasion was held and a Memorial Address was delivered by the Hon. Daniel Agnew, LL.D., of Pennsylvania.

WASHINGTON'S BIRTHDAY.

This day is observed as a holiday and is usually celebrated by the students in an appropriate manner.

On Tuesday, February 22d, 1882, exercises were held in the chapel. Washington's farewell address was read by Prof. Henry C. Johnson and orations were delivered by Messrs. Bachman, Forstall, Hoffman, Leithead and R. Stinson of the Junior Class and there was vocal music by the University Glee Club.

THE UNIVERSITY SERMON.

This sermon is preached on the Sunday before University Day.

The Rt. Rev. Henry Champlin Lay, D.D., Bishop of Easton, Md., was the preacher on Sunday, June 18th, 1882, in the University Chapel.

THESIS DAY.

On the day preceding University Day, the Theses prepared by the graduating class were publicly read.

THESES OF THE CLASS OF 1882.

Mental Enlightenment Needful for our National Stability and Progress.

CHARLES COMSTOCK HOPKINS.

The Preliminary Survey, Profile, and Earthwork Calculations for a Proposed Railroad in Northampton County, Pa.

ELMER HENRY LAWALL.

The Reconnaissance, Map, and Estimate of Cost for a Proposed Railroad in Northampton Co., Pa.

ROBERT THOMAS MORROW, JR.

Review of the Brooklyn Anchorage of the East River Bridge.

EUGENE RICKSECKER.

Plan and Estimate of Cost of a Proposed Water Supply for the Borough of Montrose, Pa.

SAMUEL BRENTON SICKLER.

Comparisons between the costs of Mining Coal by Underground Workings and by Stripping, as practiced at the Hazleton No. 6 Colliery.

MARTIN WITTMER.

THE ADDRESS BEFORE THE ALUMNI

was delivered on the evening of Thesis Day.

Lt. Commander Henry H. Gorringer of the U. S. Navy delivered the address on the evening of June 21st, 1882, in the large Drawing Room of Packer Hall.

UNIVERSITY DAY.

This day is the last of the academic year and falls in 1883 on the third Thursday in June. The exercises consist of orations and essays by members of the Senior Class.

EXERCISES ON JUNE 22d, 1882:

Reading of Scripture and Prayer by the Rev. Frederic M. Bird, A. M., Chaplain of the University.

Salutatory Oration.

ELMER HENRY LAWALL.

Oration—Specialists.

LOUIS OSCAR EMMERICH.

Oration—The Advantages of Technical Education.

ROBERT THOMAS MORROW, JR.

Master's Oration--The Rights of Men.

THOS. HUGHLETT HARDCASTLE, A.B.

Valedictory Oration.

CHARLES COMSTOCK HOPKINS.

Award of the Wilbur scholarship to Lewis Buckley Semple of South Bethlehem, first in rank in the Sophomore Class.

The following Degrees were conferred:

A.M. upon Thomas Hughlett Hardcastle, A.B., Easton, Md.

B.S. upon Charles Comstock Hopkins, Woodhull, N. Y.

C.E. upon Elmer Henry Lawall, Bethlehem, Pa.

C.E. upon Robert Thomas Morrow, Jr., Oswego, N. Y.

C.E. upon Eugene Ricksecker, Canal Dover, O.

C.E. upon Samuel Brenton Sickler, Tunkhannock, Pa.

E.M. upon Martin Wittmer, Etna, Pa.

The Benediction was then pronounced by the Chaplain.

The music upon Thesis Day and University Day was by Hassler's Orchestra.

THE WILBUR SCHOLARSHIP.

This scholarship was founded in 1872 by E. P. Wilbur, Esq., of South Bethlehem, and is the sum of \$200, awarded annually to the student in the Sophomore Class having the best record.

ALUMNI ASSOCIATION
OF
THE LEHIGH UNIVERSITY.

OFFICERS.

1882-83.

PRESIDENT :

R. W. Mahon, Lafayette College, Easton.

VICE PRESIDENTS :

H. F. J. Porter, Trenton, N. J.

Abr'm Bruner, Pittsburg, Pa.

SECRETARY AND TREASURER :

H. S. Houskeeper, South Bethlehem, Pa.

ALUMNI TRUSTEES :

Wm. R. Butler, Mauch Chunk, Pa.

W. D. Hartshorne, Lawrence, Mass.

(Term expires June, 1883.)

W. H. Baker, Philadelphia, Pa.

(Term expires June, 1885.)

Chas. L. Taylor, Pittsburgh, Pa.

(Term expires June, 1886.)

EXECUTIVE COMMITTEE.

R. W. Mahon, *Chairman*,

H. S. Houskeeper,

Wm. R. Butler,

W. D. Hartshorne,

W. H. Baker,

Chas. L. Taylor.

MEMBERS.

CLASS OF 1869.

J. H. H. Corbin, A.C., Chemist, Alamosa, Col.

Charles E. Ronaldson, M.E., Mechanical Engineer, Siemen's Regenerative Gas Furnace, 119 South Fourth Street, Philadelphia.

Miles Rock, C.E., Astronomer, U. S. Naval Observatory, 1432 Chapin Street, College Hill, Washington, D. C.

CLASS OF 1870.

* L. Preston Ashmead, A.C., M.D.

R. Brodhead, M.E., Attorney-at-Law, 74 Drexel Building, N. Y.

William R. Butler, M.E., Bookkeeper, First National Bank, Mauch Chunk, Pa.

George A. Jenkins, A.C., Bethlehem Iron Co., Bethlehem, Pa.

William J. Kerr, A.C., 2037 Mount Vernon Street, Philadelphia.

Harry E. Packer, A.C., President Lehigh Valley Railroad, Mauch Chunk, Pa.

Harry R. Price, C.E., Mining Engineer, Pottsville, Pa.

Henry B. Reed, B.A., M.D., Practicing Physician, 2300 Delancy Place, Philadelphia.

William D. Ronaldson, B.A., M.D., Practicing Physician, Longdale, Allegheny Co., Va.

John M. Thome, C.E., Astronomer, Astronomical Observatory, Cordova, Argentine Republic.

* Russell B. Yates, C.E.

CLASS OF 1871.

J. N. Barr, M.E., Superintendent Car-Wheel Shops, P. R. R., Altoona, Pa.

Frank L. Clerc, C.E., Chemist, Joplin, Mo.

H. S. Drinker, E.M., Attorney-at-Law, 218 South Fourth Street, Philadelphia.

Edward F. Fasset, A.C., 1530 Walnut Street, Philadelphia.

W. H. McCarty, B.A., New Haven, Conn.

Waldron Shapleigh, A.C., Superintendent Kings Manufacturing Company, Freeport, Ill.

* C. G. Weaver, C.E.

* Deceased.

CLASS OF 1872.

- George P. Bland, C.E., Gibson & Bland, Engineers and Contractors, 119 South Fourth Street, Philadelphia.
- D. P. Bruner, C.E., Senior Assistant Engineer, S. P. R. R., Harrisburg, Pa.
- H. St. L. Coppée, C.E., Engineer Corps, Government Improvement of Mississippi River, Delta, La.
- F. R. C. Degenhart, A.C., Chemist, Havemeyer & Bro.'s Sugar Refinery, 89 Wall Street, New York City.
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